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WORK ORGANIZATION AND WORK-RELATED MUSCULOSKELETAL DISORDERS FOR SEWING MACHINE OPERATORS IN GARMENT INDUSTRY. *P C Wang, B Ritz, D Rempel, R Harrison, J Chan, I Janowitz (UCLA Epidemiology, Los Angeles, CA 90095)

Work-related musculoskeletal disorders (WRMDs) have been reported to occur at high rates in sewing machine operators employed in the garment industry. In the context of an ergonomic intervention study of garment workers, we collected extensive baseline information on risk factors and WRMDs in sewing machine operators. Here we are reporting cross-sectional results for work related risk factors including work organization resulting in high psychosocial work stress and WRMDs. We recruited 314 Hispanic and Chinese sewing machine operators from 12 garment shops in Los Angeles, California from 2003 to 2004. Data were collected through physical exams and standardized interviews. Cases are defined as workers reporting pain at least one day per week with a pain score higher than 2 out of 5 during a one month period. Symptoms were assessed by anatomical regions but are summarized here as pain in either the upper or lower extremity. We found that upper and lower extremity pain were reported more often by workers who were paid via a piece rate adjusted for age, gender, and ethnicity (adjusted odds ratio (aOR) = 2.44; 95% confidence interval (CI): 1.2–4.8 and aOR= 2.74; 95%CI: 1.4–5.5), and who work on monotonous and repetitive work such as single machine users (aOR= 1.73; 95% CI: 0.9–3.3 and aOR=2.23; 95% CI: 1.1–4.4) and unvaried task workers (aOR= 1.57; 95% CI: 0.8–2.9 and aOR=1.36; 95% CI: 0.8–2.5). Both low decision authority and high psychological job demand were associated with an increased risk of reporting upper extremity pain (aOR= 2.22; 95% CI: 1.0–5.0 and aOR=1.85; 95% CI: 1.1–3.1). An exposure-response trend was observed for physical exertion and pain in both body sections, and physical isometric loads above the mean increased upper extremity pain. Our results suggest that work organizational factors are associated with an increased risk of reporting WRMDs in sewing machine operators.

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WITHDRAWN

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MALATHION EXPOSURE AND CANCER INCIDENCE IN THE AGRICULTURAL HEALTH STUDY (AHS) *M R Bonner, J Coble, A Blair, J A Hoppin, D P Sandler, M C R Alavanja (Division of Cancer Epidemiology and Genetics, NCI, NIH, DHHS)

Malathion (O,O-dimehtyl-S-(1,2-dicarbethoxyethyl) dithiophosphate) is the most commonly applied organophosphate insecticide in the United States and is used for agricultural as well as non-agricultural purposes. The US EPA classifies malathion as having "suggestive evidence of carcinogenicity, but not sufficient to assess human carcinogenic potential." We used the AHS, a large prospective cohort study of licensed pesticide applicators in IA and NC to examine the incidence of cancers with more than 15 malathion exposed cases (leukemia and non-Hodgkin's lymphoma and cancers of the lymphatic-hematopoietic system, colon, lung, prostate, kidney, bladder, and melanoma). Lifetime exposure-days (LD) to malathion was determined as the product of self-reported duration (years) and frequency (days) of use. Malathion exposed applicators (n=14,966) were categorized into low, medium and high exposure groups based on tertiles of LD (>0–9, 9–39, >39) from the distribution among all incident cancer cases. Applicators (n=9,145) who reported never mixing or applying malathion were the reference group. We used poisson regression to calculate rate ratios (RR) and 95% confidence intervals (95% CI) adjusting for potential confounders. After an average of 6.4 years of follow-up, we saw no increased risk for overall cancers. For leukemia, the rate ratios for low, medium and high LD compared with the non-exposed were 1.3 (95% CI = 0.4–4.0), 0.9 (95% CI =0.2–3.5) and 3.2 (95% CI =1.1–9.0), respectively. The p-value for trend was 0.01. High exposure to malathion was associated with reduced colon cancer incidence (RR = 0.4; 95% CI = 0.2–1.0) compared with the non-exposed; the p-value for trend was 0.04. In summary, we found suggestions of reduced colon cancer risk and increased risk of leukemia for applicators in the highest malathion exposure category. Exposure to malathion was not associated with any of the other cancer sites examined.

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THE HEALTHY WORKER SURVIVOR EFFECT IN THE VERMONT GRANITE WORKERS STUDY. *K L Miller and E A Eisen (Harvard School of Public Health, Boston, MA 02115)

Previous studies of lung cancer and silica among Vermont granite workers suggested an increasing exposure-response when workers with the highest exposures were excluded. In the present analysis, we explore healthy worker survivor effect (HWSE) by defining 'prevalent' and 'incident' hires according to the start of follow-up and compare results between the original cohort (both prevalent and incident hires) and a subset that includes only incident hires. Workers were identified through a medical surveillance program. Job histories were linked to silica dust measurements and cumulative exposures were generated. Cox proportional hazards modeled silica exposure with a linear term and categorical variables, controlling for age and date of death. Penalized splines were used to more clearly describe the exposure-response relationship. When restricted to incident hires, there was a 74% reduction in number of cases (original cohort n=213) and a dramatic decrease in the exposure range (maximum mg-yr/m^3: original=48.2, incident=2.1)). Using a linear term for silica exposure, the mortality rate ratio (MR) for the original cohort was null (MR=1.0 (95% confidence interval: 0.9, 1.0)), compared to 1.6 in the incident cohort (0.8, 3.2)). In the categorical analysis of the original cohort, exposure-response decreases in the highest category. For incident hires, the increasing risk extends to the higher categories, although estimates are lower than the original data set, confidence intervals are wider, and the exposure range is reduced. With penalized splines, we see a dramatic drop in the MR in the higher exposure range for the original cohort, while the MR contains increasing risk at the highest exposures for the incident cohort. Distinguishing prevalent from incident hires when defining cohort eligibility can reduce HWSE. Although this reduces power by reducing the number of subjects and likely decreases the exposure range, it is a necessary first step to elucidating disease associations in occupational cohort studies.